Letter of Dr. Alexander Wilcocks on Shadows Without Penumbra, read February 1, 1878.

EVAN HALL, NEAR DONALDSONVILLE, LOUISIANA,
26th January, 1878.

To the Secretaries of the American Philosophical Society.

I have within the last few days witnessed a phenomenon which I had diligently looked for in vain for more than forty years, viz.: The Production of a Shadow by the light of a Planet.

The body which occasioned the shadow was the planet Venus, and the circumstances under which it was seen were exceptionally favorable.

The Sun having been below the horizon an hour and a half; the Moon not having risen; the atmosphere being very clear, and the planet shining brightly in the south-west, I was passing along a white wall which faced in that direction, and saw distinctly my shadow moving upon the wall.

There are some particulars in which a shadow produced by a planet should differ from the shadows caused by the other celestial luminaries. To our unassisted vision the planets practically occupy mere points in the heavens (their apparent diameters being only an optical illusion).

The Sun and Moon having each of them a diameter which occupies about half a degree of space in the celestial hemisphere, the shadows thrown by these luminaries can never be sharp and well defined. Every such shadow must have a penumbra.

Now in the shadows produced by Venus there is no penumbra. The shadow of a hand distant twelve feet from the wall I found perfectly sharp and well defined; and more striking still, the shadows of the twigs of a Pecan tree distant fifty yards were also sharp. These last shadows were faint from the effect of the diffused light from the sky, which illumined the wall.

When in sunlight two objects are made to approach each other, there appears between their shadows a dark process which connects the two before the bodies actually come together.

In the shadows produced by Venus nothing of the kind takes place.

In sunlight a man's finger held twelve feet from a screen has a shadow consisting entirely of penumbra. The umbra has vanished.

The shadows produced by Venus are exclusively umbra.

The above observations and reflections may have been made by others; if so, they have not fallen under my notice.

P. S.—A few daws after the above remarks were penned, when the new moon was beginning to throw visible shadows, I had an opportunity to compare the strength of these with those produced by Venus.

The shadows caused by the primary planet were sharper and stronger than those thrown by our satellite.

Very Respectfully yours,

ALEXANDER WILCOCKS.

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